

1569019

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## (54) A PINEAPPLE PEELING AND CORING MACHINE

(71) We, TECK MENG ENGINEERING SDN, Berhad, a company incorporated in Malaysia, of No. 8, Taman Sri Kulai Baru, Kulai, Johor, Malaysia, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a pineapple peeling and coring machine which automatically feeds pineapples to positions where they are topped and tailed, cored and peeled.

The usual practice currently is to have one operator cutting the top and bottom off the fruits, and then passing the fruits which now have two flat ends to a further operator who loads the fruits in a press which simultaneously cores and peels the fruit. Two operators are therefore needed, and because the second operator actually has to set the fruit in the machine where it is to be cut, the safety of the operation is not as good as could be desired.

According to the invention, there is provided a pineapple peeling and coring machine comprising a central rotary member, a pineapple receiving station, a top-and-tailing station, a coring station and a peeling station all arranged at angularly spaced positions around the circumference of a circle centred on the axis of rotation of the rotary member, at least one clamp mounted on the rotary member for rotation therewith, said at least one clamp being adapted to clamp individual pineapples and being arranged so that clamped pineapples register with the stations as the rotary member rotates, and a drive for rotating the rotary member in a stepwise manner, so that a clamped pineapple registers in turn and for a discrete time interval with each station.

Further advantageous features of the present invention will be apparent from the appended claims.

The invention will now be further described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is one end view of a machine according to the invention.

Figure 2 is a view of the end opposite to that shown in Fig. 1.

Figure 2a is a detail view of part of the drive arrangement,

Figure 3 shows on a larger scale the way in which pineapples are gripped by the machine,

Figure 4a is a plan view of a top-and-tailing station,

Figure 4b is an elevation of the station shown in Fig. 4a,

Figure 5 is a view of a coring station, and

Figure 6 is a view of a peeling station.

The machine is driven by a motor 1 (Fig. 2). This motor is connected to a pulley wheel 2 on a shaft 3 by a belt 4. A smaller pulley wheel 5 also mounted on the shaft 3 is connected by a belt 6 to a further pulley 7 on a hollow spindle 8 through which the peeled and cored fruits leave the machine. These pulleys and belts are all protected within a casing 9 covered with wire mesh 10.

Within a drive housing 11, the shaft 3 is connected to a further shaft 12 (see Fig. 2a) by a chain drive. The shaft 12 carries the pin 13 of a Geneva Cross mechanism. The corresponding cross wheel 14 is mounted on a shaft 15 which drives in a stepwise manner a rotary member 16 on which are mounted clamps which actually grip the fruits.

In addition, the shaft 12 carries a 45° bevel gear 17 at its end, and this meshes with the corresponding gear 18 of a shaft 19. These gears are arranged in a casing 20.

Figure 1 shows the rotary member 16 with its four clamps for gripping pineapples. The clamp arm extending horizontally on the right hand side is unobstructed and the two clamp jaws 21a, 21b are clearly seen there. The stepwise rotation effected by the Geneva Cross mechanism turns the rotary member 16 to move the clamps between four positions around the circumference of the machine. These are indicated by the letters A, B, C, D. At A, pineapples are received from a feeding means (not shown) and are

gripped by the jaws 21a, 21b. At B the top and the tail of the pineapple are cut off. At C, the core is removed, and at D the skin is peeled off.

5 The construction of the clamps and the way in which the jaws 21a, 21b move to grip a pineapple will be more clearly seen from Fig. 3. The jaw 21a is fixed to the end of a rack 23. These two racks pass through a  
10 casing 24. In Fig. 3, the top of the upper casing has been removed, while the top of the lower, left hand casing is shown in place. Inside the casing a pinion 25 is mounted for free rotation. The teeth of this  
15 pinion engage with the teeth on the racks 22 and 23, so that when the pinion rotates, these racks are moved in opposite directions. The end of the rack 23 closest to the machine  
20 axis 26 carries a cam follower roller 27 which rolls on a cam surface 28 fixed on the axis 26. A tension spring 29 acts between the rack 23 and the rotary member 16 to pull the follower roller 27 against the cam surface 28.

25 As the rotary member 16 rotates clockwise, as shown by the arrow 30, the follower roller 27 will ride along the cam surface 28, and when it reaches the position shown by roller 27', it will have moved radially out-  
30 wards. As this happens, it causes the pinion 25 to rotate, which in turn causes the rack 22 to move backwards towards the centre of the machine. Clamp jaws 21a and 21b will therefore be spread apart at station A, but very shortly after leaving this station,  
35 when the roller 27 falls off the end of the cam surface 28, they will move sharply together to grip the pineapple. The pineapples will be fed so that they are gripped  
40 by the jaws 21a, 21b around their circumferences with the axis of the pineapple (extending between its top and bottom parallel to the axis of the machine).

45 Figure 4a shows the top-and-tailing station. The fruits gripped by the jaws 21a, 21b approach in the direction of the arrow 31. As they approach, their end portions which are to be removed brush against guide bars  
50 32. The guide bars form a part of a parallelogram linkage. This linkage comprises parallel bars 33 which are each connected at one end to a base 34 fixed to the machine, and at the other end to a support 35 carrying  
55 a knife 36. A spring 37 tends to pull the two opposite knives 36 towards one another. As the pineapple approaches, the bars 32 are pushed apart by the ends of the fruit, so that the knives 36 are spaced apart the  
60 correct distance for removing the correct amount from the ends of the fruit. In Fig. 4a, the knives 36 are shown in bold lines practically in their furthest apart position. The discarded top and tail will simply fall  
65 out of the machine to the floor. In Fig. 4b, only one side of the guide and only one

knife 36 is shown. Adjusting screws 38 permit the position of the knives 36 to be altered with respect to the support 35 so that a greater or lesser amount can be  
70 chopped off the ends of each fruit.

The coring and peeling stations C and D shown in Figs. 5 and 6, require a reciprocating movement. This is provided by the shaft  
75 19 which carries at its outer end a perpendicular arm which it rotates in a plane normal to the axis of the shaft. A further link is pivotally connected to a revolving end of this arm and to a slide 39 which is guided  
80 in a track for reciprocating movement. This slide drives both the coring and peeling mechanisms.

The coring mechanism consists of a tool holder 40 attached to the slide 39. A coring punch 41 is held in this holder and is moved  
85 towards and away from an area 42 where a fruit is held by the jaws, only one of which is shown. The actual coring takes place between a guide plate 43 and a stopper bracket 44. A rubber bumper 45 is mounted  
90 in the stopper bracket 44 to prevent damage to the cutting edge of the coring punch. The punched out fruit cores will be pushed back through the centre of the punch by the next core.

95 In the peeling section, each fruit is pushed through a cylinder 46, the opening of which is surrounded by a knife edge 47. The fruit is pushed on to the knife edge 47 by a pusher plate 48 attached to a head 49 connected to the slide 39. A pin 50 extends  
100 from the plate 48 and, in use, extends through the core hole of the fruit to centre this as it passes through the knife 47. As the pusher plate 48 advances, a cam actuator 51 causes the jaws 21a, 21b to be opened. This  
105 actuator is shown at 51a turned through 90° from its actual operational position, so that its manner of operation can be seen. It slides over the wheel 52 attached to the jaw 21a and pushes the jaw 21a back. Because of  
110 the connection between the two jaws 21a and 21b, this will cause the jaw 21b also to be moved out away from the fruit.

The pin 50 is slideable in a tube 53 which connects the pusher plate 48 with the head  
115 49. A bolt 54 is screwed into the pin 50, and can move backwards and forwards along the tube 53 along a slot 55. A spring 56 biases the pin 50 backwards. The pin has an annular groove 57 in which a retaining  
120 member 58 engages to prevent the spring 56 pulling the pin backwards during the advancing movement of the head. Towards the end of the advancing movement, the retaining member 58 is lifted out of the groove  
125 57 by a cam mechanism generally indicated at 59, and when this happens the pin 50 moves back to the position shown in chain dotted lines against an abutment 60.

A number of radially-directed knives can 130

be arranged around the outside of the cylinder 46 to slit the peel longitudinally so that it drops off the cylinder. These are not shown in the drawings

- 5 The motor 1 can suitably be a two horse power motor arranged to drive shaft 3 at a speed of 940 rpm. The Geneva Cross mechanism is arranged to give a dwell period of 2.3 seconds at each station.

- 10 At the left hand end of the peeling station (figure 6) the hollow exit spindle 8 is supported by six specially made roller bearings. One end of spindle 8 is threaded, and all different sizes of peeling cutters 47 can be mounted on the threaded end of the spindle. 15 The other end of the spindle is driven by the belt 6 at a speed of 125 rpm. The broad side of the spindle is 100mm diameter which is a standard size for pineapple canning.

- 20 As previously mentioned, a wire mesh guard is provided over the pulleys at the end of the machine shown in figure 2. In addition, a protective cover is provided for the perpendicular arm connected to the end of the shaft 19. Further protection is provided to prevent an operator's hand from touching the rotary member 16.

- 25 The fruits can be fed to the machine along a channel by an operator pushing one fruit after another. The core and skin of the peeled fruit is collected by suitably arranged ducting.

- 30 The gearing of the shaft 19 is arranged so that one reciprocating movement of the slide 39 takes 2.3 seconds.

#### WHAT WE CLAIM IS:—

1. A pineapple peeling and coring machine comprising: a central rotary member, a pineapple receiving station, a top-and-tailing station, a coring station and a peeling station all arranged at angularly spaced positions around the circumference of a circle centred on the axis of rotation of the rotary member, at least one clamp mounted on the rotary member for rotation therewith, said at least one clamp being adapted to clamp individual pineapples and being arranged so that clamped pineapples register with the stations as the rotary member rotates, and a drive for rotating the rotary member in a stepwise manner, so that a clamped pineapple registers in turn and for a discrete time interval with each station.

- 55 2. A machine as claimed in Claim 1, wherein the rotary member has four clamps equi-angularly spaced about its axis of rotation and the four said stations are also equi-

angularly spaced so that, at any step in operation, a pineapple is being operated on at each of the said stations.

3. A machine as claimed in Claim 2, wherein the clamping action of the clamps is controlled by a cam fixed on the axis of rotation of the rotary member.

4. A machine as claimed in claim 2 or claim 3, wherein each clamp has two jaws which are connected to opposite sides of a pinion gear, so that when one jaw moves in one direction, the other jaw moves in the opposite direction.

5. A machine as claimed in any preceding claim, wherein the top-and-tailing station comprises two knives and each knife is attached to a parallelogram linkage, the linkages including bars on either side of the path of a fruit, which bars converge in the direction of travel of the fruit so that the fruit contacts the bars and pushes them apart as it approaches the knives which are thereby spaced the correct distance apart.

6. A machine as claimed in Claim 5 wherein the position of each of the knives is adjustable relative to the linkage to which it is attached.

7. A machine as claimed in any preceding claim, wherein the coring station comprises an abutment plate and a hollow coring punch which is driven towards and away from the plate, so as to cut out the core of a fruit on a strike towards the plate.

8. A machine as claimed in any preceding claim, wherein the peeling station comprises a circular knife edge, a pin for entering the hole left by the core, and a pusher plate which pushes the fruit, centred by the pin, against the circular knife edge.

9. A machine as claimed in Claim 8, wherein the peeling station further comprises means for releasing each clamp from a respective fruit before the fruit reaches the knife edge.

10. A machine as claimed in Claim 8 or Claim 9, wherein radially directed knives are arranged around the outside of the circular knife edge to slit the skin of the fruit as it is removed by the knife edge.

11. A pineapple peeling and coring machine substantially as herein described with reference to and as shown in the accompanying drawings.

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COMPLETE SPECIFICATION

7 SHEETS

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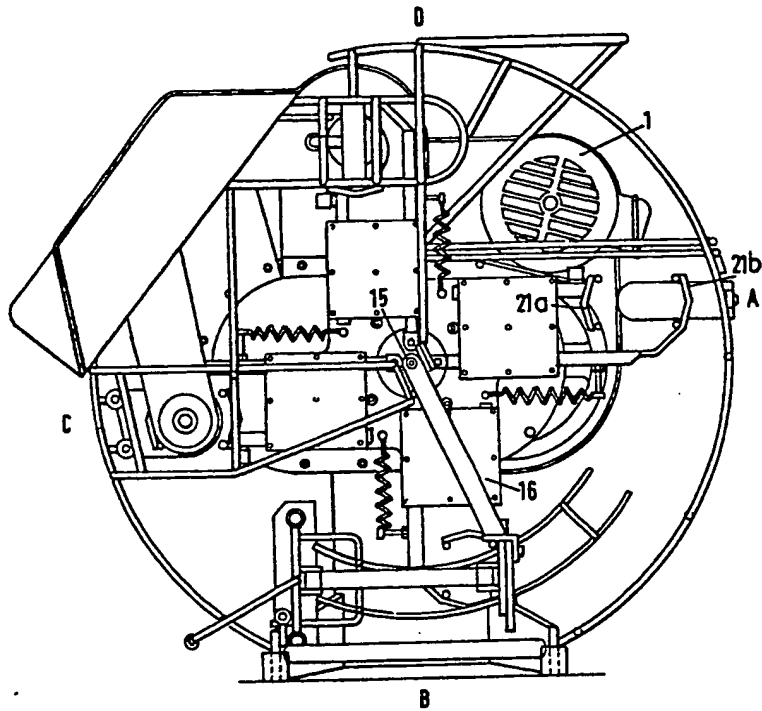


FIG. I.

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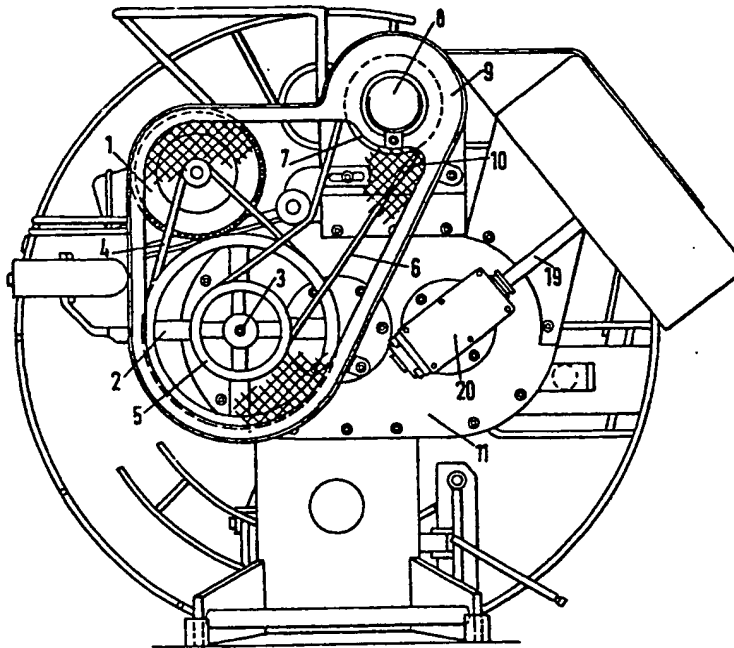


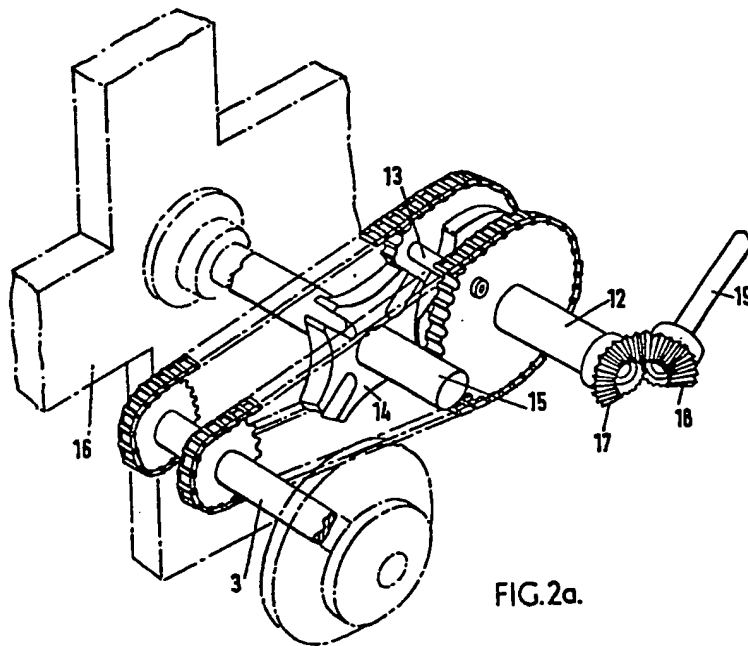
FIG.2.

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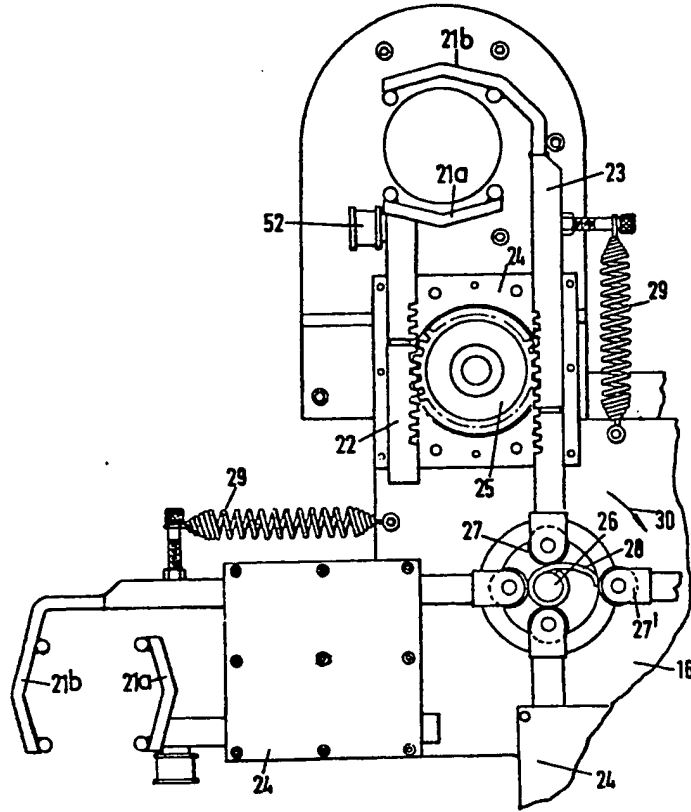


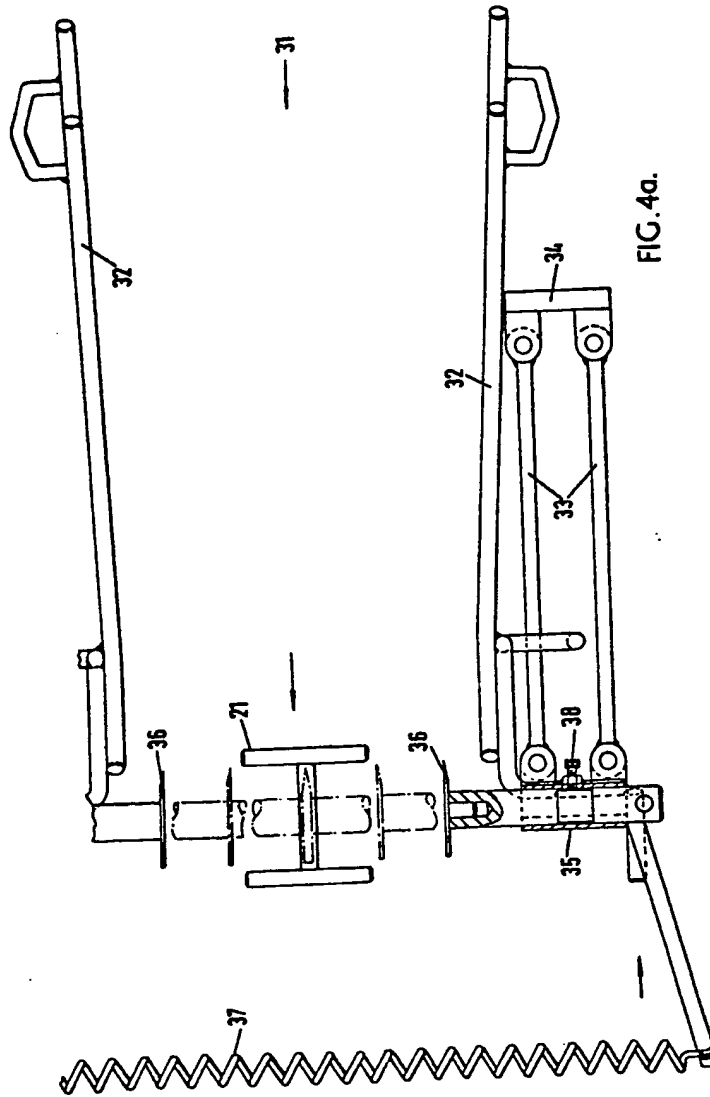
FIG. 3.

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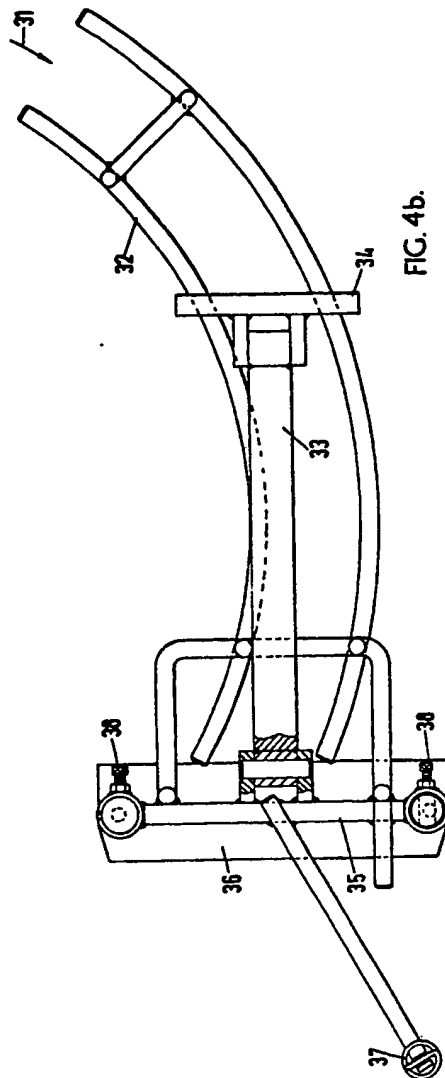


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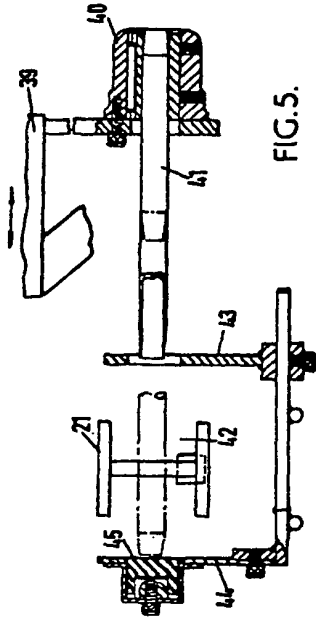


FIG. 5.

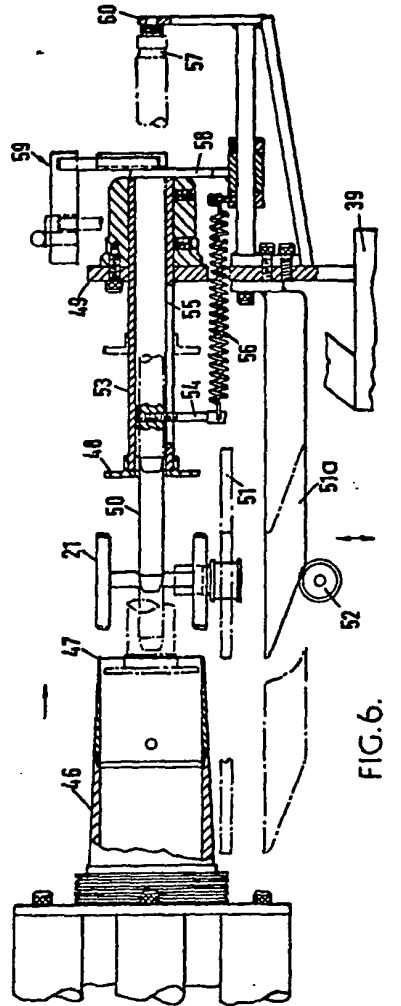


FIG. 6.